Beyond the emission market: Kyoto and the international expansion of waste management firms[1]

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Abstract

This paper analyses the participation of firms without GHG emission liabilities as technology providers in CDM and JI projects, the flexibility mechanisms of the Kyoto Protocol. It argues that the motivations for those firms to engaging in CDM and JI projects is based on market *stimuli* beyond those related to the emission market itself. Instead, their motivations are largely associated with search for new markets where their technological resources and expertise can be exploited. The analysis is based on three firms from the Dutch waste management industry. These cases suggest that the Kyoto's mechanisms compensate to some extent the weakness of the underdeveloped waste management sector in developing and transition economies.

Key word:

Waste Management Industry, Kyoto Protocol, International Expansion, Firm-specific advantages

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1. Introduction

The Kyoto Protocol is generally recognized for its paramount aim to reduce the global level of greenhouse gas (GHG) emissions and for the global emission market it has created. The market-based approach is a key aspect of the Protocol, and follows recent trends from the environmental policy domain to engage the private sector in the achievement of public goals.

The Kyoto's emission market is pivoted on the splitting of the signatory countries into two groups: developing countries with no emission limits; and developed countries, the so-called Annex I countries with bound targets to reduce their GHG emissions. Within the latter, the national emission-reducing targets are allocated to local entities, business firms mainly, according to the level of GHG emissions their activities generate.

Three flexibility mechanisms put the Kyoto emission market into motion: the Clean Development Mechanism (CDM), the Joint Implementation (JI), and the Emissions Trading (ET). Together these market-based mechanisms allow flexibility to countries and business firms in meeting their reduction targets, based on credits of GHG emission reduction - the Certified Emission Reduction (CER). CERs can be generated by CDM and JI projects hosted by respectively developing and transition economies, and be used to offset an actor's own emission liabilities, or negotiated in the global emissions market. In principle, CDM and JI projects have to involve the deployment of technologies leading to the reduction or avoidance of GHG emissions in the host country. Business firms often based on developed economies own the bulk of such technologies. The possibility of obtaining CERs is assumed the key incentive for these firms to deploy their technologies and expertise in CDM and JI projects.

This chapter argues that the motivations of firms with no emission liabilities to participate as technology providers in CDM and JI projects go beyond the revenues they can obtain from selling the emission credits earned from such projects. Instead, their motivations are based on opportunities for exploiting their technologies and expertise, and (further) expanding their business internationally, particularly towards untapped markets located in developing and transition economies. The rationale of this argument is three fold. First, as a rule the core business of such firms is directly associated with the environment, inasmuch as their firm-specific advantages are based on environmentally friendly technologies and expertise. Secondly, given the imperfect nature of the markets in which those firms operate, their emergence and sustainable growth, as well as the generation and diffusion of relevant technologies and expertise are intrinsically associated with government policy intervention. Thirdly, it is reasonable to assume that the combined implication of the two previous aspects is that the expansion of firms in such green markets is geographically bounded.

The objective of the chapter is to substantiate this argument by analysing the participation in CDM and JI projects by three business firms from the Dutch waste management industry, more specifically from the segment of solid waste. The selection of Dutch firms from this segment for the case studies was due to two main reasons. First, waste handling and disposal represent an important technological area in terms of CDM and JI: it accounts for 20.9 per cent of all CDM projects registered (UNFCCC), and around nine per cent in terms of JI (UNEP/RISOE, 2008). Second, the development and consolidation of the waste management industry has taken place within developed economies, resulting from the adoption of market-enabling policy instruments as an alternative to the traditional command-and-control policies. The Netherlands is a

benchmark case of how government policies have been crucial in creating and enabling the business environment for this sector.

The chapter is organised as follows. Section 2 focuses on the role of market-based policy instruments in stimulating the development of firms and technologies in environmentally friendly sectors, and discusses the role of the Kyoto Protocol as market enabler. Section 3 addresses the role of government policies and the development and structure of the waste production chain. Section 4 turns to the Dutch waste management industry and Section 5 present the analyses of the case studies. Section 6 concludes the analysis and suggests issues for further research.

2. Market enabling policies, the Kyoto Protocol and firms' expansion

The use of market-based instruments strategically combined with strict environmental regulations and political support have pushed the development of clean technologies and adoption of practices that minimize or avoid, among others, GHG emissions, even before the introduction of the Kyoto Protocol (Jaffe and Palmers, 1996; Kemp, 2006; Newel, 1997). Since the 1980s, the traditional command-and-control approach to environmental policies has been challenged by the emergence of alternative policy instruments based on market incentives and flexibility, such as producers and polluters charges and tradable emission permits (Stavins, 1998; Voß, 2007).

The adoption of this market-based approach, mainly by developed economies has led to the appearance and consolidation of business firms specialized in various environmental technologies. Among examples are renewable energy, energy efficiency, soil remediation, waste treatment and so forth. The core business of firms from such green markets is directly associated with the environment, inasmuch as their competitive advantages are based on environmentally

friendly technologies and expertise. This is in contrast to the case of firms from pollution-intensive industries, where the adoption of environmentally sound business practices are mainly to comply with environmental regulations, and green competences are not part of firms' core competitive advantages (Rugman and Verbeke, 1998).

Another important characteristic of green industries is the imperfect nature of their markets. Hence, the emergence and sustainable growth of business firms, as well as the generation and diffusion of relevant technologies and expertise are intrinsically associated with government policy incentives (Jaffe and Palmers, 1996; Newell, 1997). However, the crucial role played by government policies in creating market incentives to propel environmentally based industries, combined with the localised nature of environmental issues may lead to geographical bounds to firms' growth. Hence, the exploitation of firm-specific advantages and market expansion of green firms may be limited to the geographical reach of their government policies, and the characteristics of their original environment.

Regional, international and multilateral policies can help to overcome such local-boundaries to the expansion of firms from green industries. The European Union's environmental policies are emblematic examples on this regard. In this line, it can be argued that the Kyoto Protocol can also be considered as playing the role of market-enabler; opening market opportunity to the expansion of green firms.

Kyoto and firms' international expansion

The Kyoto Protocol aims to mobilize business firms to apply their resources, technologies and expertise for the avoidance and reduction of GHG emissions. For this purpose, it applies market-

based instruments at the multilateral level, creating the economic incentives for engaging business firms in the international effort to control GHG emissions.

The direct and active participation of the business sector is crucial for the functioning of the Kyoto Protocol. There are two reasons for that. First, a substantial part of the national emissions targets is of the responsibility of local business companies, which are expected to seek the most cost-effective and credible GHG emission reduction strategies to meet their emissions targets. Second, business firms based in developed countries control the lion's share of the technologies and expertise expected to be transferred to developing and transition economies via CDM and JI projects, respectively.

Business firms with and without emissions reduction targets can participate in CDM and JI projects. Further, this participation can be either direct (for example as project developers, technology providers, equipment suppliers, consultants and environmental auditors) or indirect (for example as emissions buyers, brokers, banks and some other intermediary parties). The majority of studies on the participation of business companies in the Kyoto Protocol's mechanisms are related to the emission market itself. The most studied cases are those of large companies from developed countries with emissions reduction targets, particularly of their strategies for emissions reduction (Kolk and Pinkse, 2005; Hamilton and Kenber, 2006). However, the very fact is that these companies are not always directly involved in the design and implementation of CDM and JI projects, and tend to be mainly buyers of CERs in the emissions trading market, motivated by the need to offset their own emissions liabilities. To the best of our knowledge, there is no comprehensive study dealing with business companies that do not have emission reduction targets to meet and yet have been directly involved in the technical

implementation of CDM and JI projects, due to their knowledge and expertise on emissions reducing or avoiding technologies. It seems reasonable to assume that the Protocol, by means of its flexibility mechanisms represents opportunities for firms to exploit their technologies and expertise, and (further) expanding their business internationally, particularly towards untapped markets located in developing and transition economies.

3. Government policies and the waste management industry's production chain

The waste management industry offers many examples of successful implementation of market-based policy instruments, specially in Western Europe and of how the state and the business sector can work together to address negative externalities, meeting both public and private interests. Furthermore, the technologies and expertise associated with this industry represent an important area under the Kyoto Protocol. They involve the capture or avoidance of methane, a GHG 21 times stronger than carbon gas generated from the decomposition of organic waste.

Waste, in its nature, does not seem to have much of economic attractiveness. The traditional and most usual way of dealing with waste is to dump it in areas referred to as landfills. However, the disposal of waste in landfills leads to many negative externalities, such as ground water pollution, fire and explosion hazard, odour, soil pollution, and so forth, representing a treat to both the environment and human health. The problems associated with landfills increases with the volume waste. With the rapid economic and population growth, increasing welfare and consumption, the volume of waste is ever growing (Cointreau, 2007; The Economist, 2007).

The 1990s represents a hallmark in government policies on solid waste with the first examples of adoption of market-based instruments, notably in the United States and Western Europe. The use

of market-based approaches to address the negative externalities generated by waste, and indeed to reduce the amount of waste at first place, has fostered the development of an entire production chain and its related technologies that can be referred to as the waste management industry. Nowadays, the waste management industry is consolidated in many developed countries, and comprises many technologies and schemes for collecting, sorting, treating, reusing and recycling various materials.

Inputs: turning waste into a commodity

The core input in the waste management industry is waste itself. Thus, the very first step in the waste production chain involves its collection and transportation. A related activity refers to the separation of waste according to its composition, such as organic waste, plastic, glass, metal, paper and so forth. A basic step is the separation of the organic waste at the household level. The sorting of non-organic waste can be either combined with collection or performed as an individual step, depending on the collection scheme adopted. The quality of the inputs, associated with aspects such as the levels of moisture or hazardous waste, depends on how well collection and sorting schemes are designed and implemented. As in any other industry, it will affect all the following stages of the waste treatment and recycling production chain. Government policies at different levels - municipal, national or regional have been crucial in ensuring the availability and quality of waste inputs. Market-based instruments such as pollution charges, pay-as-you-throw schemes, landfill fees and bans have been frequently used in order to make waste disposal in landfill costly, and to ensure the supply of inputs for different segments of the waste management industry.

Processing: turning waste commodities into valuable goods

There is a broad range of alternatives to treat and recycle waste, differentiated according to types of materials. The basic distinction is between organic waste, recyclable waste (for example, glass, metals, paper, and so forth.) and non-recyclable waste. It is largely accepted that biological treatment is by far a much better option to deal with organic waste than the traditional landfilling. By means of processes such as aerobic decomposition, commonly known as composting, and anaerobic decomposition organic waste can be turned into amendment for agriculture and gardening, avoiding the generation of methane (Eenhoorn, 2007). Many countries have banned the disposal of organic waste (among other materials) in landfills, but the fact is that the dumping of waste in landfills is still in practice in most of the countries all over the world. Although, it is important noticing that there are differences in terms of regulations and standards imposed on landfills, and that the operation of landfills has become a sophisticated engineering and managing activity. For instances, techniques to capture and convert into energy the methane generated by landfilled organic material, also known as waste-to-energy, have been developed, and widely diffused among developed economies. In the case of recyclable waste, the processes are as many are the materials composing it. For instances, glass and metals can be re-melted indefinitely, and initiate a new life cycle as raw materials for many industries; paper can be turned into pulp and than used to produce new paper (The Economist, 2007). As for the non-recyclable waste, the two main alternatives are landfilling and incineration, with the latter being preferable to landfilling particularly when it involves energy recovery (Kemp, 2006; Parto et al., 2006). In fact, the incineration of non-recyclable waste, the so-called waste-to-energy, represents an increasingly important source of renewable energy.

Outputs: energy and recycled materials

The output stage of the waste management chain refers to the diverse range of products from the waste treatment and recycling processes. While it is obvious that the output of the recycling of paper, plastic, glass and metal are the same materials; the outputs from the treatment of organic waste and non-recyclable waste diverges from its original composition, including high quality compost, organic fertilisers, biogas, heat and power. The prices of waste outputs serve as an economic viability factor for the entire waste management scheme. It is important that recycled raw materials and products can compete against virgin raw materials and other products (Eenhoorn, 2007). On this regard, policy instruments that secure market demand and prices ensuring economic return are crucial for the success of the entire waste management industry. Examples of such supportive instruments are the guaranteed procurement of electricity generated from landfill and incinerators and the reduction of the market price of recycled materials via tax exemption.

The waste players

The large variety of ways to processing and treating solid household waste implies the existence of different players. Hopstaken (2007) identify three main groups of waste firms, according to their business concepts: multi-utility firms that encompass activities from sectors as diverse as waste, energy, transport and water; vertically integrated firms that cover different stages of the waste production chain, from collection, recycling and treatment; and niche player firms focussed on technology, concept, region or segment. This group includes, for example, firms specialised in the recycling of specific materials such as plastics, paper and metals. Producers of equipment and machines, such as sorting machines can also be included in this group. In terms of capital, the composition between public and privately owned firms varies from country to country, and according to the stages of the waste production chain..

Waste management industry: a national or international business?

The characteristics of the waste management industry differ from country to country, and even among regions or municipalities within the same countries. The policy approach adopted at different government levels is crucial in defining the contours and dynamics of this market. Together with the local nature of waste generation, the central role of government policies implies that the advantages of waste firms tend to be locally bounded. In other words, in the absence of enabling conditions somewhere else, waste firms tend to have their expansion limited to their local markets.

One of the international aspects of this industry is the movement and trade of waste material across borders. There have been some examples of developed countries, or municipalities within these countries, exporting recyclable waste materials to recycling firms overseas, or simply for landfill dumping. Nowadays, China is the largest market for recyclable raw materials (The Economist, 2007). From the perspective of local waste firms, the export of inputs, that is waste, may not be positive to their business. The movement of waste for landfill dumping in foreign countries, or in different provinces within the same countries, is also a common practice that involves many controversial issues (Parto et al., 2006). This practice has been restricted as many countries and provinces in both the United States and Europe introduce landfill bans.

In terms of firms' international expansion, a process of increasing internationalisation of the waste management industry has been observed over the last decennia or so (Hopstaken, 2007; SenterNovem, 2006). Regional or international regulations and standards, such as those defined by the NAFTA or the European Union represent an important driving force of this process. For

example, the requirements for the Eastern Europe countries to meet the EU standards regarding local waste management practices have opened opportunities for waste firms from Western Europe to operate and provide services in this region, enlarging the geographical scope of their market.

In fact, the internationalisation of the waste management industry would be better regarded as "regionalisation", as it has been mainly observed within regions, the European Union in particular. Europe is still the stronghold of the largest European waste firms, with consolidated position in Western Europe and increasing participation in East Europe. This process is associated with a strong concentration observed in this industry (Hall, 2007). A few number of large waste management firms account for a great share of the European waste market. The two largest European waste firms are the French multi-utility Veolia/Onyx and SUEZ/SITA (Hall, 2007; Hopstaken, 2007). These two France based firms retain a significant leading position ahead of their counterparts, and are about twice the size of the third and fourth largest European waste firms, respectively German Remondis/Retherman and the Spanish FCC (Hall, 2007; Hopstaken, 2007). These two firms, by their turn, are two or three times larger than the following group of firms composed by Biffa (UK), Urbaser and Cespa/Ferrovial (Spain), and Alba (German), and the recently merged AVR/van Gansewinkel[5], originally Dutch firms they are currently owned by the private equity funds KKR (US) and CVC (Europe) (Hall, 2007; Hopstaken, 2007). It is worth noticing that all the big players in the European waste industry are based in Europe, with non-participation of non-European firms, with the only exception to the KKR private equity fund. Waste firms from the United States, for instance, have concentrated their activities within their

[5] AVR, the largest waste firm in the Netherlands was acquired by KKR/CVC in January 2006 from the Municipality of Rotterdam; while van Gansewinkel, the third in the Dutch market in 2006 and originally privately owned, was bought in January 2007 (Hall, 2007).

home country, a movement explained by the huge size of the North American waste market. By 2001, the two largest US waste firms, Allied Waste and Waste Management Inc. had withdrawn from Europe and from the rest of the world (Davies, 2001).

It is intuitive that the limits for the expansion of waste firms are closely related to the access to sources of waste, the industry raw material. The generation of waste can be affected by efforts to avoid it at the first place, but the primary factor affecting the availability of waste inputs is the size of the population. Hence, the access to the untapped potential market in developing and transition economies is recognized as an opportunity for waste firms, specially for the small and medium ones, to exploit their technological expertise and to growth. Indeed, the case of technologies associated with the capture of and energy recovery from landfill is emblematic. In countries where complete landfill ban is already in place, as in the Netherlands, firm's advantages in landfill gas tend to loose value in a not so far future.

4 The waste management industry in the Netherlands

The Dutch waste management industry is one of the most advanced in the world. Recycling, reuse and incineration cover around 97 per cent of the total 60 million tonnes of municipal waste generated in the Netherlands (Gerlagh, 2007). Only three per cent of the household waste generated in the country goes to landfills, while 84 per cent is recovered and 13 per cent incinerated (Bartelings et al., 2005; Gerlagh, 2007; Hopstaken, 2007). The number of operating landfill sites in the Netherlands fell from 1000 in 1976; to 39 in 2004 and to 22 in 2007 (Gerlagh, 2007). These figures are followed by reduction of related negative externalities. For instance, the emissions of methane from landfills decreased by 18 per cent during the 1990s (Environmental Expert, 1998; SenterNovem, 2006). Concomitantly to the decrease of landfilling, the capacity for

incineration with energy recovery, that is waste-to-energy, has been increasing in the Netherlands (Gerlagh, 2007).

The Dutch waste market is estimated in around EUR 5.35 billion when considering the total turnover from the inputs, treatment, recycling and outputs stages (Bartelings et al., 2005; Hopstaken, 2007). In line with trends in the European waste market, there has been a movement towards concentration, vertical integration and increasing of firms' size (Davies, 2001; Gerlagh, 2007; Hall, 2007; Hopstaken, 2007; van Bezooijen, 2007; Parto et al., 2006; SenterNovem, 2006). The top five waste firms operating in the Netherlands – the AVR/VG, the French SUEZ/SITA, the Dutch public multi-utility Essent, and the UK-headquartered Shanks, account for 40 per cent of the Dutch waste management market (Hopstaken, 2007; van Bezooijen, 2007).

The implementation of the waste management in the Netherlands is supported by institutional and organizational arrangements, and involves public and private parties (Eenhoorn, 2007). Government's main task is to design, implement and enforce adequate anti-dumping regulation. For example, a landfill ban for different materials is combined with a high landfill tax of EUR 115 per ton, the highest in the European Union (SenterNovem, 2006). The municipal governments are responsible for ensuring a proper waste collection, either by contracting private companies to collect and transport the waste to treatment plants or by establishing their own companies. Moreover, incentive schemes encouraging sorting activities at household level have been widely and successfully applied. The multi-stream collection schemes adopted in the Netherlands have achieved very high waste separation results at the household level.

The participation of private business firms in the treatment and recycling of waste is very significant the Netherlands. According to the Vereniging Afvalbedrijven, the association of Dutch waste management companies, over 40 companies located in different regions are involved in the various waste processing activities as well as a large number of small firms are involved in niche activities such as disassembling cars, electronics and other equipments. According to Hopstaken (2007), the top 6 to 15 waste firms account for 15 per cent of the Dutch market[6], while the top 16 to 25 waste firms account for another six per cent, and the remaining smaller waste firms contributed to 40 per cent of the market revenues.

On the output side, a market for recycled products has been quickly maturing in the country. For few types of waste recycling products, the market demand has been created through direct public involvement. An example of state-induced-demand comes from the construction and demolition waste. By requiring public biddings for road constructions to use mainly recycled construction and demolition waste instead of virgin materials from riverbeds or quarries, a large and steady market was created. Nowadays close to 100 per cent of waste from construction-and-demolition is recycled in the Netherlands (Eenhoorn, 2007).

In sum, the well functioning of the waste management industry in the Netherlands is the result of a proper addressing of the input, processing and output stages, and a clear definition of responsibilities of the public and private parties. The government ensures availability and quality of the input through institutionalization of waste collection and separation, and creates market for recycled products. In other words, government intervention creates an enabling business environment, allowing business firms to overcome market failures and to grow in a sustainable

[6] Within this group is VAR, which is one of the firms analysed in this chapter.

way. This synergy of state policy and business interests has created a favourable soil for the Dutch waste management and recycling companies to develop resources and expertise defining their firm-specific advantages.

5. Expansion of Dutch waste firms under the Kyoto

This section analyses the participation of three firms from the Dutch waste management industry as providers of technologies and expertise in CDM and/or JI projects. The analysis focuses on motivations, form of participation and future strategies in relation to CDM and JI projects. The cases are analysed against the conceptual framework of market enabling governmental policies and international expansion of firms possessing unique resources and capabilities.

The selection of the firms for this study was based on the CDM documentation available at the website of the United Nations Framework Convention on Climate Change (UNFCCC). Initially, five Dutch companies involved in waste management projects were identified, Biogas Technology Group; Arcadis; Van der Wiel/Ecair, VAR/WWR and Grontmij. The three latter agreed to participate in this study[7].The analysis is based on in-depth interviews with these firms carried out in September and October 2007. It has also benefited from an interview with a representative of the SenterNovem, an agency of the Dutch Ministry of Economic Affairs that promotes the environmental and innovation policies. Moreover, given this is an under researched area, anecdotal evidences have been also considered, as well as additional and updated information from the firms' websites.

[7] The selection was made in July 2007. Information on participants in JI projects are not available in the UNFCCC website.

Van der Wiel Holding BV - VdW/Ecair

Van der Wiel Holding BV is a medium-sized privately owned firm, with 320 employees and a turnover of around EUR 85 million. It has been working for half a century in the areas of transport, infrastructure and environment. Landfill gas recovery and methane capture is one of its areas of expertise. VdW directly implement or provide consultancy for projects of biogas, landfill gas and CO_2 reduction.

VdW's international activities have been significantly enlarged by the Kyoto Protocol's mechanisms. Previously to CDM and JI, VdW was involved in three projects outside the Netherlands, in Poland, Belgium and Iran. CDM and JI projects are considered by the VdW as important channels for the further exploitation of its core advantages on landfill methane capture and energy conversion (waste-to-energy). VdW participation in CDM and JI is through its subsidiary Ecair. In terms of JI, Ecair has one project in Romania (2005), two projects in Poland and eight projects in Slovakia. As for CDM, VdW/Ecair has three projects in Brazil, one in Argentina and two in Malaysia.

The first largest CDM by VdW/Ecair is the Bandeirantes landfill project in Brazil, which has generated over 8 million tonnes worth of CERs. The pattern followed by VdW/Ecair suggests that once it enters a certain country or a region with CDM or JI project, it starts to consolidate its local presence by looking vigorously for further possibilities for new projects in the same country or the region. Further strategic plans defined by VdW/Ecair, includes targeting at least 14 new countries, in addition to those where the company has already projects, among them, Mexico, Chile, China, Thailand, Vietnam, Indonesia, the Baltic states, Czech Republic, Hungary and Bulgaria.

Veluwse Afval Recycling BV - VAR/WWR

VAR BV is an integrated waste firm, with expertise in landfill management, recycling of construction and demolition waste, sorting activities and composting. It employs 148 people and has an annual turnover of around EUR 50 million (VAR, 2006).

In order to expand its activities towards developing economies, VAR established the World Wide Recycling BV in 2004. WWR's mission is to implement and operate VAR's technologies in countries around the world, by adapting it to meet specific local circumstances. Along with landfill projects, the World Wide Recycling has taken a very active part in composting projects and in fact became a pioneer in developing and getting approval for organic composting-related methodology for calculating emission credits[8]. Moreover, WWR is supporting the World Bank with registering composting projects under CDM in the Middle East and Asia. It is worth mentioning that previously to CDM and JI, VAR's international activities were based on composting projects in Ireland, Belgium, France and Russia.

VAR/WWR's first two CDM projects are under implementation in Bangladesh, and represent an important experience to VAR/WWR. First, Bangladesh is one of the least developed economies in the world and normally not very attractive for CDM projects. Second, the effective functioning of the projects has been ensured by a partnership with the Bangladeshi NGO Waste Concern and extensive efforts on the promotion of collaboration with local municipalities.

[8] See "Avoided emissions from organic waste through alternative waste treatment processes - AM0025", Available at: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html. Giving its experience, WWR is providing consulting for the World Bank on methodological issues of CDM projects in waste management.

VAR/WWR is designing three JI projects in Eastern Europe and few CDM projects in Asia and Latin America, particularly in Brazil, where it opened a subsidiary company.

Grontmij

Grontmij is a multinational firm headquartered in the Netherlands, with units in five other European countries: Belgium, Denmark, United Kingdom, Sweden and Ireland. It employs 6337 people and has a net revenue of around EUR 390 million (Grontmij, 2006). Ninety per cent of its revenue is from the Western Europe, 70 per cent being from the Netherlands alone. Grontmij is a consultancy and engineering firm in the areas of building, transportation, environment, energy, water, and other industries. Waste management is one of the areas composing its environment division. Its expertise on this area is related mainly to waste water purification and soil remediation, with few activities related to solid waste.

Grontmij has a broad international experience, and has been working for around 15 years in many European countries, such as Hungary, Poland, Czech Republic, Romania, Bulgaria, Croatia and in Turkey. Furthermore, it is one of the few companies with very early experience with GHG emission cutting projects. In 1994-1997 under the so caller Activities Implemented Jointly, which was a pilot program for CDM and JI schemes, Grontmij successfully implemented two projects on landfill gas capture in Russia.

Nevertheless, Grontmij has not been directly involved in CDM and JI projects currently. It had two CDM projects but withdrew from further participation before the technical implementation stage started. This decision was due to potential risks in terms of profit performance related to changes in the regulations in the host countries. Yet, Grontmij has been indirectly involved in

CDM and JI by providing technical consultancy services on technologies related to biogas, biomass, energy efficiency, wind, waste to energy, digestion and combined heat and power production and distribution. Moreover, it offers services to project owners and investors in carbon resources, for instance in terms of the approval and registration of projects by international and national authorities.

Grontmij acknowledges that there is business opportunities related to CDM and JI projects, but it does not consider them a priority area at this moment. Grontmij has based its expansion on its diversified portfolio and already consolidated international experience.

Functions, parties and business model

Ecair and WWR participate in all stages of projects cycle, starting from feasibility assessment and basic design to final installation, starting-up of the facilities and monitoring. Moreover, both companies ensured initial financial investments. In all their projects, other companies have been involved either as equal partners or on a short-contract basis. Local counterparts are important elements for the success of the projects. In general, the day-to-day operation of the facilities after the installation is due to be done by local partners trained by Ecair and WWR. Furthermore, the establishment of dialog with local municipal agencies in order to ensure their legal (and if possible technical) support has been important in all projects analysed.

In fact, the participation of local governments is crucial for the long-term sustainability and escalation of the projects, and for the development of the entire waste management cycle, for example waste collection and input, management of the landfill sites, and so forth. The waste

sector in developing countries tends to lack regulatory incentive and legal enforcement mechanisms in all stages of the waste production chain.

The case of waste-to-energy is illustrative. Often, the methane captured in CDM and JI landfill projects is simply flared without energy recovery. In general, national power grid prevailing in developing countries does not favour the market for small-scale energy producers. The barriers can be related to both technical and economic aspects. Power distributors in many developing countries, usually state-owned or monopoly companies, often have no procedures to connect small-scale power units and purchase their electricity. Furthermore, the low purchasing prices do not cover the cost of small-scale electricity production. There are some exceptions, where local factors can play a positive role to the viability of the projects. For instance, in the case of WWR's composting projects in Bangladesh, the revenues from compost are important. Comparing to the Netherlands, compost has a higher demand and price in the Bangladeshi market. Nevertheless, the feasibility of the business models adopted in these pioneering CDM and JI projects s is ensured by the Kyoto's emission credits mainly.

Notwithstanding that, both VdW/Ecair and VAR/WWR are very keen to expand their CDM and JI businesses. All the three companies interviewed anticipate are rather optimistic about the perspectives related to post Kyoto time, after 2012.

6. Concluding remarks

This chapter took the challenge to shed light on an under researched issue, to wit, the participation of firms without GHG emission liabilities as technology providers in CDM and JI projects, the flexibility mechanisms of the Kyoto Protocol. It argues that the motivation for those

firms to engaging in CDM and JI projects is based on market *stimuli* beyond those related to the emission market itself. Their motivations are largely associated with search for new markets where their technological resources and expertise can be exploited.

The cases studied in this chapter suggest that the Kyoto's mechanisms compensate to some extent the weakness of underdeveloped waste management sector in developing and transition economies. By ensuring revenues from emission credits, CDM and JI reduce market imperfections associated with the waste industry, and hence the feasibility of the investments. As a result, the Kyoto Protocol stimulates investments and plays a similar role as the one played by government policy in the developed countries.

The multilaterally ensured market created by the Kyoto Protocol has represented an important factor for the international expansion of small and medium business firms from the Dutch waste management industry. By engaging in CDM and JI project these firms are able to access new source of inputs, exploit their technological expertise, establish their brand names in the host countries and identify local partners, paving their way to future international ventures, related or not to the Kyoto Protocol. In other words, CDM and JI projects may have a multiplying effect and serve as reasonable way for business companies from the waste management industry to enter and to try new markets in developing and transition economies. This can be considered as an indication that the motivations of firms with no emission liabilities to provider technology and expertise for CDM and JI projects are strongly associated with the possibility to entering untapped potential markets, with the emissions revenues being a feasibility factor.

As usual, some caveats should be mentioned. First, a broader study encompassing waste management firms from other countries would help to make a stronger case for the argument put forward in this chapter. Second, the extension of this analysis to other green industries would be insightful. Latter but not least, the Kyoto Protocol is still a new institution, inasmuch as not many CDM and JI projects have been concluded so far. Studies covering a longer time spam, including for instance scenarios for the pos-Kyoto activities of green firms in the emerging economies would be welcoming.

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